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ABSTRACT

Because students encounter a steady stream of new words in their reading, structural analysis--the ability to gain information about the meaning, pronunciation, and part of speech of new words from their prefixes, roots, and suffixes--is an important component of skilled reading. It follows, then, that effective reading instruction should include helping students gain and apply knowledge of structural analysis. Instruction should provide explicit explanations of both how and when to use structural analysis; take into account the diversity of English word structure, and adapt instruction to the different problems posed by the compounds, prefixes, and suffixes; make clear to students the limitations of structural analysis--how to recognize when it does not work, and what to do about it; and to use extended text in opportunities for application. Structural analysis instruction should be grounded in context and provide numerous opportunities for students to determine the meanings of prefixed words, derivations, and compound words in extended text. Effective instruction must aim for strategic use of structural analysis. Students should be given sentences containing unfamiliar w rds that could, orthographically at least, be broken down into a familiar stem plus an affix, and then asked to decide whether their analysis leads to a meaning compatible with the context. Strategic use of structural analysis involves using it in concert with other strategies for dealing with new words. (Twenty references are attached.) (Author/RS)

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CENTER FOR THE STUDY OF READING

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Technical Report No. 554

GUIDELINES FOR INSTRUCTION IN STRUCTURAL ANALYSIS

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Abstract

Because students encounter a steady stream of new words in their reading, structural analysis--the ability to gain information about the meaning, pronunciation, and part of speech of new words from their prefixes, roots, and suffixes--is an important component of skilled reading. This report reviews research on how children gain and apply knowledge of structural analysis and offers guidelines for effective instruction. Instruction should provide explicit explanations of both how and when to use structural analysis; take into account the diversity of English word structure, and adapt instruction to the different problems posed by compounds, prefixes, and suffixes; make clear to students the limitations of structural analysis--how to recognize when it doesn't work, and what to do about it; and use extended text in opportunities for application.

GUIDELINES FOR INSTRUCTION IN STRUCTURAL ANALYSIS

Encountering new words is a normal and necessary part of reading. The vocabulary of written English consists of a relatively small number of words that occur very frequently and an extremely large number of words that occur only infrequently. Hence, in any given sample of text, no matter how large, a substantial proportion of the words will occur only once.

For example, including all reading both in and out of school, the average fifth grader reads somewhere around 1 million words of text in one year (Anderson, Wilson, & Fielding, 1988). Ten thousand of those words will be words that the student sees only *once* in the year. An avid fifth-grade reader will encounter several times that number. The student will have encountered very few of these low-frequency words in earlier grades; therefore, she or he will be seeing most of them in print for the first time.

Ten thousand words may seem to be an absurdly high estimate for the number of new words the average fifth grader encounters in a school year. To make this figure more understandable, we undertook an analysis of a sample of the words that occurred only once in the corpus collected by Carroll, Davies, and Richman (1971) (see Nagy & Anderson, 1984, for a more detailed analysis of the Carroll et al. corpus). On the basis of this analysis, we can account for the composition of the 10,000 "new" words that an average fifth-grade student might encounter as follows:

- About 4,000 are derivatives of more frequent words, for example, *indebtedness, unromantic*, or *metalware*.
- Another 1,300 are inflections of more frequent words (e.g., the words *merges* and *merited* occurred only once each in a corpus of 5 million words, although the stems *merge* and *merit* occurred more frequently).
- About 1,500 are proper names.
- About 2,200 words fall into a variety of categories -- capitalizations of more frequent words, numbers, deliberate misspellings, algebraic expressions, and other odd things that show up in a large sample of real text that has been sorted by a computer.
- About 1,000 are truly new words, not directly related to more familiar words.

The point is that the 10,000 words seen only once in a year by this student are not all really "new." More than half are clearly related to more familiar words. Skilled readers probably do not even think of a word such as *merited* or *unromantic*, seen only once in a year of reading, as new in any way. They automatically recognize the relationship of these words to their more familiar stems (Nagy & Anderson, 1984). Readers who cannot discern the relationships, however, face real difficulties in reading.

Skilled reading, therefore, depends not just on knowing a large number of words, but also on being able to deal effectively with new ones. Skilled readers are not readers who never encounter words they do not know, but rather, are readers who cope effectively with words that are new to them.

How do skilled readers deal with new words? Three sources of information are available. Skilled readers can use (a) context to infer a word's meaning, (b) phonics to determine a word's pronunciation, and (c) structural analysis, or knowledge of word parts, to determine both a word's meaning and pronunciation.

The literature of reading instruction contains a great deal of information about the strategies of context use and phonics, but it contains relatively little information about the contributions of structural analysis instruction to word identification and vocabulary acquisition and about the relative efficacy of different instructional approaches.

One reason for the relative lack of information about structural analysis is lack of research (see, e.g., Graves's 1986 review of vocabulary instruction). Another reason seems to be simply lack of attention. A lot of theories, beliefs -- and emotional and political energy -- have been devoted to the topic of phonics. In contrast, only a little energy -- and as far as we can determine, no emotion at all -- has been given to structural analysis.

In this report, we examine this somewhat unexamined aspect of reading instruction. We start by reviewing what is known about English word structure on the basis of linguistic analysis and about how this structure is acquired and used by readers. Although more research is certainly needed, we have some confidence in laying out guiding principles for evaluating and improving instructional practice in this area.

Defining Structural Analysis

To begin, we must make clear what we mean by the term *structural analysis*. Structural analysis can most easily be defined as "the use of word parts to help determine the meaning and pronunciation of words." This simple definition, though accurate, does not clearly distinguish structural analysis from phonics, because it does not specify what exactly sorts of "word parts" are used.

To distinguish the domains of structural analysis and phonics, and to make clear distinctions among different kinds of word parts, we need to review the meanings of some of the terminology basic to structural analysis -- terms such as *morpheme, affix, prefix, suffix, derivative, root, base, stem*, and *compound*.

Morpheme. Morphemes are usually defined by linguists as "minimal units of meaning." For example, *stoplight* can be broken down into the units *stop* and *light* on the basis of meaning. These units can of course be broken down further in terms of letters or sounds, for example into onset (the initial consonant or consonant cluster) and rime (the vowel and any following consonants that belong to the same syllable). At this level of analysis, the words *stop* and *light* can be further analyzed as *st/op* and *l/ight*. In fact, the analysis of words into onsets and rimes may be an important step in children's first attempts to break words into smaller pieces and become aware of their individual sounds (Adams, 1990). Some successful spelling programs have capitalized on the onset/rime distinction to help students make more sense out of the apparent irregularities of English orthography. However, the division of a word into onset and rime has nothing to do with its meaning.

Although morphemes are defined as minimal units of meaning, the conception of meaning must be a broad one. For example, it must include what can be called "grammatical meaning." The *s* in *walks* is considered a morpheme, although its contribution to *walks* is in its grammatical function.

Morphemes are categorized into *free* and *bound* morphemes. Free morphemes constitute words in themselves and can occur alone (e.g., *walk*, *to*, and *below*). Bound morphemes, on the other hand, cannot occur except in combination with other morphemes (e.g., th[illegible] in *walks*, the *de* in *decontaminate*, and the *cardio* in *cardiovascular*).

Affix. Affixes include *prefixes* and *suffixes*. Affixes are bound morphemes (e.g., *un-* or *-ness*). Not all bound morphemes are affixes, however. For example, the *caut-* in *cautious* and *caution* is a bound morpheme but not an affix.

Among affixes, a distinction can be made between *inflectional* and *derivational* affixes. Inflectional affixes mark number and tense. Words differing only in their inflectional affixes are considered to be different forms of the same word (e.g., *help, helps, helped, helping*). In English, inflections are usually marked by suffixes. On the other hand, derivational affixes appear as both prefixes and suffixes and result in different words (*helpless, unkind*) rather than in different forms of the same word. In English, all prefixes are derivational affixes; for example *underestimate, disobey*, and *inconsiderate* are considered to be separate words from their stems. We use the term *derivative* for any word containing at least one derivational suffix or prefix.

Neutral affixes are those that can be added only to free morphemes, that is, morphemes that can stand alone as words. For example, *-ness* is a neutral suffix. When you take *-ness* off a word -- if it is really a suffix in that word, that is -- you always have a word left. Non-neutral affixes, on the other hand, can be added either to free or bound morphemes. The suffix *-ity* is a non-neutral suffix; it can be added to words (as in *rationality*) or to bound morphemes (as in *capacity*). Neutral suffixes do not change the spelling of a word, except for the regular change of *y* to *i* as in *happiness*, and seldom change its pronunciation (the word *business* is an obvious but lone exception). On the other hand, non-neutral suffixes are often associated with changes in both spelling and pronunciation, as can be seen in pairs such as *sane/sanity, profound/profundity,* and *pronounce/pronunciation*. Not surprisingly, there are differences in the way neutral and non-neutral suffixes are learned (Tyler & Nagy, 1989).

Root, base, stem. The terms root, base, and stem are used more or less interchangeably for what is left when the affixes are removed from a word or when a compound word is divided into parts. To the extent that a distinction is made among these terms, *root* and *base* refer to a single morpheme (i.e., what is left when a word has been exhaustively analyzed). *Stem*, on the other hand, is most often used for what is left when a single particular affix has been removed. For example, *disagree* would be called the stem of the word *disagreement*. The term root or base would be reserved for *agree*.

Compound. A compound is usually defined as a word made up of two or more other words. In other words, compounds are typically made up of free morphemes (e.g., *keyboard, headache*). However, combinations of bound morphemes such as *petrochemical* or *thermometer* are also usually classed as compounds. The terms *hyphenated compound* and *open compound* are used for compounds in which the parts are separated by a hyphen (*free-lance*) or space (*ice cream*), respectively.

Structural Analysis and Phonics

The simple definition of structural analysis given above -- the use of word parts to help determine the meaning and pronunciation of words -- does not make a clear distinction between structural analysis and phonics.

To some extent, a distinction can be made in terms of purpose. Both structural analysis and phonics instruction have to do with parts of words, and the major goal of both is to enable students to deal with unknown words by breaking them into smaller, more familiar parts. The primary goal of phonics instruction, however, is to help students with the pronunciation of unknown words, whereas the primary goal of structural analysis instruction is to give students insight into both the pronunciations *and* the meanings of unknown words.

However, there is still substantial overlap in terms of purpose. Even when the primary goal of structural analysis is figuring out the meaning of an unfamiliar word (that, for example, *botanophobia* means "fear of plants"), the analysis of a word into familiar meaningful parts is a helpful step in determining its pronunciation as well.

The primary difference between structural analysis and phonics is in the *nature* of the word parts used to analyze the internal structure of words. English words have several differing aspects of internal structure. Some have to do with spelling, others with word recognition, others with pronunciation, and still others with meaning. For example, skilled readers come to recognize common letter patterns -- that *q* is usually followed by *u*, that *t* is often followed by *h*, and that *d* is seldom followed by *l*, except when the two are in separate syllables, as in *headless*. Familiarity with such patterns aids word recognition, but has nothing to do with meaning. Skilled readers also use word parts that have to do with the relationship of spelling and sound, for example, syllables, and spelling patterns such as, *ight* as in *light* and *fight*, *at* as in *bat*, *fat*, *mat*. Words are analyzed into morphemes, on the other hand, on the basis of meaning.

Phonics is most often defined as dealing with units of pronunciation (individual letters, digraphs, consonant clusters, and syllables), whereas structural analysis deals with units of meaning, or morphemes. The distinction between units based on meaning and units based on sound or spelling is fundamental. Dividing words into morphemes is not the same as dividing a word into syllables. *Walked* consists of one syllable but two morphemes. *Number* consists of two syllables, but only one morpheme. Students must recognize this distinction in order to understand the concepts prefix and suffix. Otherwise, they may not distinguish between real and "phantom" prefixes (the *re* in *reconsider* and *reality*), and end up looking for "little words in big words" -- finding *moth* in *mother* or *fat* in *father*.

Although we believe the nature of the units to be the most natural place to draw a line between the domains of phonics and structural analysis, we caution against too rigid a line. Any attempt to draw such a line, particularly on the basis of meaningfulness of the units involved, can lead to problems.

Many of the problems that have arisen in trying to clarify the relationship between phonics and structural analysis instruction stem from either a mislabeling of the terms or from the imprecise or ambiguous definition of key definitional concepts. Syllabification, for example, is often labeled as a form of structural analysis, even though syllables are units of pronunciation and not of meaning.

A more basic problem grows out of the definition of morphemes as minimal units of meaning. As we have already noted, "meaningful" in this definition includes the notion of grammatical function. Thus, treating the *s* in *wanders* or the *ness* in *orangeness* as morphemes in not controversial. In fact, dividing these words in this way is intuitively reasonable. How to describe the meanings of such morphemes, however, is usually a problem. Abstract definitions of suffixes, such as defining *-ion* as "the state, condition, or result of," are usually more confusing than helpful to young students.

Furthermore, English does not allow us to draw a clear line between what constitutes a meaningful unit within a word and what does not. The division of *snowman* into *snow* and *man* or *fleeing* into *flee* and *ing*, is straightforward (although it is difficult to put into words exactly what the meaning of *ing* is). But, the meanings of many words are not so clearly related to the meanings of their parts. English words range over a full continuum -- from total semantic regularity (e.g., *sleeplessness*) to complete semantic irregularity (e.g., *understand* or *shiftless*) -- with every conceivable intermediate degree of partial regularity. Words like *foxtrot* and *understand* are obviously not related to the meanings of their parts. Less obvious, and perhaps more troublesome, are words that bear some relationship to the meanings of their parts. The meaning of the compound *waterbed* seems clear enough, but if you didn't already know about waterbeds, knowing the meanings of *water* and *bed* might not be sufficient information. You might accept "riverbed" or "bed that has been wet" as equally reasonable meanings.

An even greater problem is posed by words that contain parts that do not have clearcut meanings. Thousands of English words have parts that are borrowed from Latin or Greek. Some of these have consistent meanings (e.g., the *hemo* in *hemophilia* or *hemorrhage*). On the other hand, many Latin and Greek roots have no discernable core of meaning to those not knowledgeable about their history. The

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morpheme *ceive* in *deceive* and *conceive*, *fer* in *confer* and *interfere*, or *duce* in *produce*, *reduce*, and *deduce* does not transmit meaning to most American students. Latin and Greek prefixes (the *ob* in *obtain*, the *apo* in *apology*) can be even more obscure.

Strictly speaking, then, structural analysis could best be distinguished from phonics by defining it as "the use of *morphemes* to help determine the meaning and pronunciation of words." This definition is more precise than the one utilizing word parts (although *morpheme* is not in everyone's vocabulary). Nevertheless, because of the structure and history of our language, the domain of structural analysis is somewhat vague.

How Students Utilize Knowledge of Word Structure

Word structure knowledge begins to develop in early childhood. Berko (1958) found that preschool children show some ability to use suffixes and compounding to coin new words; Condry (1979) found second graders able to infer the meanings of new words on the basis of word structure. Word structure knowledge continues to grow through the school years (Tyler & Nagy, 1989), and continues to increase even after high school (Nagy & Scott, 1990; Sternberg & Powell, 1983).

Different aspects of word-structure knowledge appear to be acquired at different times and at different rates. Tyler and Nagy (1989) investigated the word-structure knowledge of students from fourth grade through college, and found that the ability to recognize novel derivatives of familiar stems was already largely in place by fourth grade. However, students' knowledge of the syntactic function of derivational suffixes (e.g., that words ending in *-ness* and *-ion* tend to be nouns) only began to develop in fourth grade, and then increased throughout the school years.

Skilled readers use structural analysis in at least three ways: to recognize known words more efficiently, to remember the meanings and spellings of partially learned words, and to figure out the meanings and pronunciations of new words.

As we have said, the most obvious role of structural analysis is to help students figure out the meanings of new words. Nagy and Anderson (1984) estimate that as many as 60% of English words have meanings that can be predicted from the meanings of their parts, and that for another 10%, word parts may give useful, albeit incomplete, information. In brief, the bulk of new words will be cases like *nontoxicity*, the meaning of which is transparently related to its parts. A smaller number of words will be like *roadrunner* -- a case in which the word parts help some with pronunciation, and may have something to do with meaning, but give incomplete or potentially misleading information.

Although students are able to use knowledge of structural analysis to interpret the meanings of new words (Tyler & Nagy, 1989), they often fail to apply knowledge of structural analysis where it would be helpful (White, Power, & White, 1989; Wysocki & Jenkins, 1987). The extent to which they do utilize structural analysis is related to their reading ability (Freyd & Baron, 1982). Instruction in structural analysis therefore can be expected to improve students' ability in interpreting new words.

Structural analysis may also play an important role in remembering the form of new words. Readers encountering the word *electrocution* for the first time may both decode it more accurately and remember it better, if they see its relationship to *electric*. Knowledge of this relationship may also help readers avoid confusing the word *electrocution* with similarly spelled words such as *elocution*.

Structural analysis may also help students remember the meanings of words, even in cases where the meanings of the parts are not sufficient to reveal the meaning of the whole. For example, seeing the *impression* in *Impressionism* will not give a student enough information to pass an art history

examination. Knowing why the art movement was called "Impressionism," however, and what this label has to do with impressions, may help students remember the rationale for the movement.

Structural analysis can also help with decoding and spelling, even when it does not help with meaning. The word part *ceive*, for example, makes little contribution to the meaning of the word *perceive*. But recognizing that this unit is a recurring element that is also found in *receive, deceive,* and *conceive* may be of help in remembering the spelling of all of those words. In this way, knowledge of affixes and roots can be helpful in decoding and spelling words, even where these units do not supply useful information about the meanings of words.

Knowledge of structural analysis also benefits readers by allowing them to recognize words more efficiently. The effects of frequency on word recognition are well documented; words that frequently appear in print are recognized more quickly than less frequent words. However, speed of recognition is determined not just by the frequency of the whole word, but by the frequency of its parts as well. For example, the word *quietness* occurs very seldom in print, about as frequently as the words *sup, matador*, or *brindle*. However, the word *quietness* is likely to be recognized more quickly than these other words, because it consists of parts that are more frequent in the language. Although the results of research on the role of affixes in recognizing familiar words are not unanimous, there is good evidence that the frequency of parts of words plays a role in word recognition (Nagy, Anderson, Schommer, Scott, & Stallman, 1989; Taft, 1979, 1985).

In summary, skilled readers make use of structural analysis to support their word recognition and meaning construction. It follows, then, that effective reading instruction should include measures to help students to gain knowledge of structural analysis and to apply this knowledge while reading.

Guiding Principles for Instruction

Reviews of research related to instruction in structural analysis (Graves, 1986; White, Power, & White, 1989) indicate that such instruction is potentially valuable, especially for lower achieving students. It must be acknowledged that relatively few such studies have been conducted--Graves mentions only five--and that there is little, if any research comparing alternative approaches to structural analysis instruction. Nevertheless, despite the need for more research, we are confident that we can already outline some guiding principles for instruction in structural analysis.

The principles we suggest are based on three sources of information. The first is what we have just covered--what is known about English word structure, and how knowledge of that structure is acquired and utilized by readers. A second source of information is the growing body of knowledge in the field of reading concerning how skilled readers comprehend text, and repair comprehension when it breaks down--and also how less-skilled readers can learn to do the same. Although this literature has not dealt explicitly with structural analysis, there are a number of points at which more general principles of comprehension instruction have clear and specific implications for instruction in structural analysis.

A third source of information on which we base our suggested guiding principles for structural analysis instruction is a review we conducted of structural analysis instruction and practice in the teachers' manuals and student workbooks of six basal reading programs. The six programs, all with 1989 copyrights, were selected on the basis of their popularity and because they represented a diversity of approaches to instruction. A detailed report of this review is available as a Center for the Study of Reading Technical Report (Winsor, Nagy, Osborn, & O'Flahavan, 1992). In this review, we focused our attention on instruction relating to prefixes, suffixes, and compound words. Specifically, we looked at lessons in the programs to gather information about four aspects of instruction and application: (a) definition of terms, (b) rationale for instruction, (c) approaches and procedures, and (d) opportunities for application. We did not begin with a set model of ideal instruction against which we measured our

observations. However, examination of concrete instructional materials did provide us an opportunity to see how implications based on our first two sources of information might be realized--or not realized--in classroom practice.

Our recommendations for effective instruction in structural analysis can be stated in terms of five guiding principles. We will explain each of these in turn, commenting briefly on how each principle appears to be followed, or not followed, in the basal lessons we reviewed.

Provide Explicit Explanations

Research on comprehension instruction reveals that students often need to be told explicitly why they are doing some particular activity. In the case of structural analysis, it is important to make clear both the immediate purpose--determining the meaning and pronunciation of an unfamiliar word--and the ultimate purpose--to construct a coherent meaning for the text. In the basal instruction we reviewed, an explicit statement of the immediate purpose was usually provided. However, neither the explanations suggested for teachers to give to students, nor the application activities offered, gave much indication of the ultimate purpose. We believe that it is important to convey clearly to students that structural analysis, like other word-level strategies, is subordinate to the goal of gaining meaning from text.

Furthermore, students often also need to be shown clearly when and how to apply a strategy such as structural analysis. As with instruction in other types of strategies, teacher modeling is very important. For example, the teacher reads aloud a paragraph containing a word to which structural analysis could be applied, and "thinks aloud," explaining as thoroughly as possible how to apply knowledge of structural analysis:

> Here's a word I haven't seen before. The first thing I'll do is see whether I recognize any familiar parts--a prefix, stem, or suffix--or maybe it might be a compound. Okay, I see that I can divide this word into a stem I know, and a suffix. So the meaning of this word must have something to do with . . . . Now, I'll see if that meaning makes any sense in this sentence . . . .

Students should then be given guided practice with other paragraphs, with the teacher providing prompts and questions as needed. As students learn how to apply what they have learned, the teacher's prompts can be diminished or withdrawn.

This approach of modeling, guided practice, and gradual release of responsibility to students has been described at length for other aspects of comprehension instruction (Pearson & Dole, 1987); the principles can be applied to instruction in structural analysis in a rather straightforward fashion.

Rely on Examples More than Abstract Rules, Principles, or Definitions

Certainly, concepts such as *prefix*, *suffix*, and *compound* must be taught as part of instruction in structural analysis. However, these concepts are more abstract and potentially difficult for students than may be apparent, and need to be illustrated with numerous examples.

The basal program instruction we reviewed provided examples of these concepts. However, there are three points at which we think special care is needed.

First, although the goal of structural analysis instruction is to help students interpret new words, we believe that initial instruction on concepts such as prefix, suffix, and compound should explore these concepts with words that are already familiar to the students. That is, students must be made aware of the internal structure of words they already know before they analyze unfamiliar words. A person

may be quite familiar with the word *basement*, for example, and yet never have noticed that it can be analyzed into the stem *base* and the suffix *ment*. If students do not understand the role of an affix in at least some familiar words, it is highly unlikely that they will be able to use this affix as a tool for interpreting the meaning of unfamiliar words. Therefore, we recommend that initial instruction in key concepts of structural analysis be anchored in the known. It should deliberately focus on words that are sure to be familiar to students before any attempt is made to analyze new words.

A second point concerning the use of examples has to do with using non-examples as well as examples. To learn a concept such as prefix, a student needs to see not just examples of what a prefix is, but also, examples of what it isn't. *Re-* is a prefix in *redo*, but not in *real*. In only three of the six programs we reviewed did we find explicit mention of the possibility that the letters making up a prefix might not actual function as a prefix in some of the words in which they occurred.

Some students may have serious misconceptions about the nature of English morphology and about what constitute effective strategies for utilizing word-structure information. These misconceptions are likely to be exacerbated by poorly conceived instruction. For example, asking students to "look for little words in big words," can turn up *car* in *cargo* and *must* in *muster*. Effective instruction, therefore, must include means for diagnosing the existence of misconceptions and provide examples that explicitly distinguish between the misconceptions and the intended concepts.

A third case in which use of examples is especially important is in teaching the meaning of suffixes. The meanings of suffixes consist primarily in their grammatical function. Such meanings are abstract and cannot be adequately conveyed by short definitions. The suffix *-ed* may mean "past," but *walk* plus *-ed* does not mean "walk past." It is essential, therefore, for structural analysis instruction, and especially instruction on derivational suffixes, to focus on the relationship between a word's structure and its role in a sentence.

Research suggests that the ability to recognize parts of a complex word develops earlier than knowledge of what a derivational suffix such as *-ness* or *-ity* contributes to a word; even in junior high and high school some students may not have a clear grasp of how suffixed words function in sentences or differ from their stems (Freyd & Baron, 1982; Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). Thus an emphasis on recognizing parts of words is most important for the early grades. As the students get older, there should be an increasing emphasis on grammatical function of suffixes. However, instruction must illustrate the function of suffixes (e.g., by contrasting the use of stem and derivative in sentences) rather than relying on abstract definitions (e.g., by defining *frustration* as "the state or condition of being frustrated").

Recognize the Diversity of English Word Structure

Instruction in structural analysis must deal with the diverse types of word parts. Instruction for affixes must be distinguished from instruction for compounds. Whatever the differences between prefixes and suffixes, they are more similar to each other than either is to compounds. We cannot assume, however, that the instruction that is best for prefixes will necessarily be the best for suffixes, or vice versa. The differences between prefixes and suffixes involve more than just their position with respect to the stem. Prefixes may be processed differently than suffixes (Taft, 1985). Prefixes also differ from suffixes in their content. Suffixes, both inflectional and derivational, tend to convey grammatical information -- what part of speech the word is, and how it functions in the sentence. Prefixes, tend to convey different kinds of meaning. Several prefixes (e.g., *un-*, *in-*, *dis-*, *a-*) convey negation. Others (e.g., *trans-*, *in-*, *re-*, *sub-*) convey meanings associated with direction.

The distinction between free and bound stems is also important for instruction. Research suggests that students can use knowledge of affixes effectively when the stems are themselves English words; that is,

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they can find the *confine* in *confinement*. On the other hand, there little evidence that skilled readers make any use of bound stems (such as the *fer* in *transfer*) in recognizing or learning words (Carroll, 1940; Shepherd, 1973). However, it is likely that a distinction should be made between vague Latin roots such as *ceive*, *lect*, *fer*, and *mit*, and fairly specific (usually Greek) roots such as *hemo*, *petro*, or *anthropo*. (Of course, distinctions must also be made among different functions of structural analysis. Latin roots with vague meanings, for example, are conceivably of use in learning to spell, and in some cases in remembering the meanings of new words, even if they are unlikely to function as part of an independent word-learning strategy.)

Instruction should also take into account that affixes and roots differ widely in their frequency in the language, and hence in their potential utility. Some suffixes and prefixes are found on dozens, even hundreds of words; others occur only infrequently. Some Greek roots are found largely in technical or scientific vocabulary.

A distinction must also be made between different types of knowledge about structural analysis. One part of using structural analysis is the ability to recognize the familiar parts of a complex word, that is, seeing that a new word such as *confinability* is made up of the elements *confine*, *able*, and *ity*. Another part is knowledge of the function of affixes, that is, knowing that *communicative* is an adjective, and hence used in certain ways in a sentence, whereas *communicativity* is a noun, and therefore used differently.

Make the Limitations of Structural Analysis Clear

Part of giving explicit instruction in structural analysis is letting students know its limitations--reminding them that structural analysis may sometimes give incomplete or misleading information, or no information, and explaining how to recognize such cases and what to do when they arise.

As we have mentioned, only half of the basal programs we reviewed warned students about "phantom" affixes, that is, cases like the *re* in *real* or the *ness* in *harness*. Nor was there consistency in warning students about the semantic irregularities associated with structural analysis -- for example, the *casual* in *casualty* or the *emerge* in *emergency*. Some of the programs did instruct students to check to see if the meaning derived through structural analysis made sense in the sentence. However, we think that this point needs to be made more frequently, and more forcefully.

Use Extended Text in Opportunities for Application

Instruction in structural analysis is unlikely to transfer automatically to reading. Just because children have learned how to divide words into roots and suffixes in workbook exercises, we cannot assume that they will apply this skill to the reading of connected text. Instruction in structural analysis must target specifically the kinds of application we expect students to make; therefore, opportunities for applying structural analysis to extended text are an indispensable part of structural analysis instruction. In the lessons we reviewed, however, students were seldom asked to apply what they had learned about structural analysis to extended texts.

Among the reasons for having students practice applying structural analysis to extended texts is the need for them to learn how to coordinate information gained through structural analysis with information from other sources, especially context and background knowledge. Affixed words and compounds do not always mean exactly what one would predict from their parts, and they can occasionally mean something quite different; it is therefore essential that students learn to coordinate the information they gain from different sources.

Conclusion

Structural analysis instruction must function to help students develop strategic and flexible use of word parts as a means of constructing word meaning. Because the information in word parts, although usually helpful, can often be incomplete and, in fact, sometimes misleading, structural analysis instruction must also help students become fully aware of its limitations. Structural analysis instruction will be strengthened by closer and more intense alignment with the real task that reading actual text presents to students--that of meaning construction. Specifically, we urge that structural analysis instruction be grounded in context and provide numerous opportunities for students to determine the meanings of prefixed words, derivations, and compound words in extended text.

Effective instruction must aim for strategic use of structural analysis. It is likely that most students have acquired the basic skill of structural analysis--recognizing that a new word can sometimes be broken into familiar parts that reveal something about its meaning--before fourth grade (Tyler & Nagy, 1989). What is less likely to be developed, and more in need of instructional attention, is knowing *when* to use structural analysis. Although some programs warn students about the existence of "phantom" affixes, they offer little, if any, opportunity for students to apply this distinction. We recommend that students be given sentences containing unfamiliar words that could, orthographically at least, be broken down into a familiar stem plus an affix, and then asked to decide whether their analysis leads to a meaning compatible with the context.

Strategic use of structural analysis involves using it in concert with other strategies for dealing with new words. Using context to check the plausibility of meanings determined by structural analysis is an important part of coordinating strategies; but we recommend that structural analysis be incorporated into a more comprehensive set of strategies including, for example, deciding how important a word is for understanding the text, when one can get by without knowing the precise meaning of the word, and when using a dictionary or glossary is worth the effort.

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